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THE MUSHROOM GROWERS'
ASSOCIATION

MGA
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CONTENTS

	Page
Editorial : Those Increased Subscriptions (G. W. Baker)... ...	395
LA FRANCE DISEASE : Fred. C. Atkins	396
MUSHROOM RESEARCH AT THE GLASSHOUSE CROPS RESEARCH INSTITUTE: F. W. Toovey (Director)	399
Cartoon by "Bev"	405
FARM MECHANISATION : J. Stewart-Wood	407
Stanley Middlebrook's Pinheads	410
Over £1,000 for Hungarian Relief Fund : G. W. Baker	412
Refresher Course for 1957—No Exhibition	412
EASTBOURNE EXHIBITION & CONFERENCE	414
Junior MGA?	417
Competition Results	418
MGA Annual Lunch and A.G.M.	418
Eastbourne Pictures	420
Will Mushrooms Control Cancer?	425
Survey of Occurrence of Tumor Inhibitors—Higher Basidiomycetes : E. H. Lucas and J. A. Stevens	425
Dactylium or Cobweb Disease : J. A. Gathercole, B.Sc.	428
Publicity Contributors—November	430
NEW SUBSCRIPTION RATES	430
Those Behind the Publicity Drive	431
Eastbourne Trade Show	432
Large Composter—Picture	433
MEMBERSHIP LIST	436

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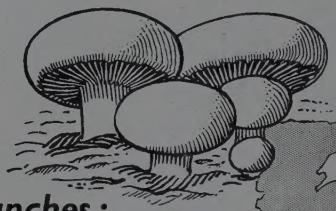

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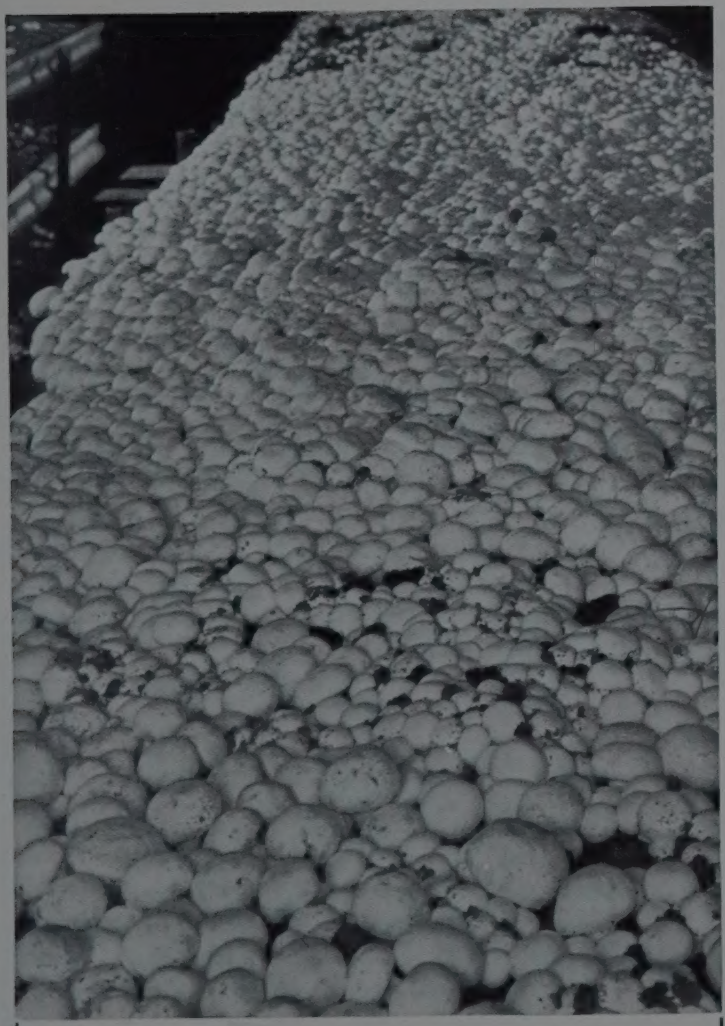

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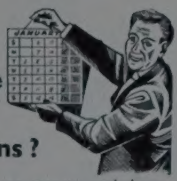

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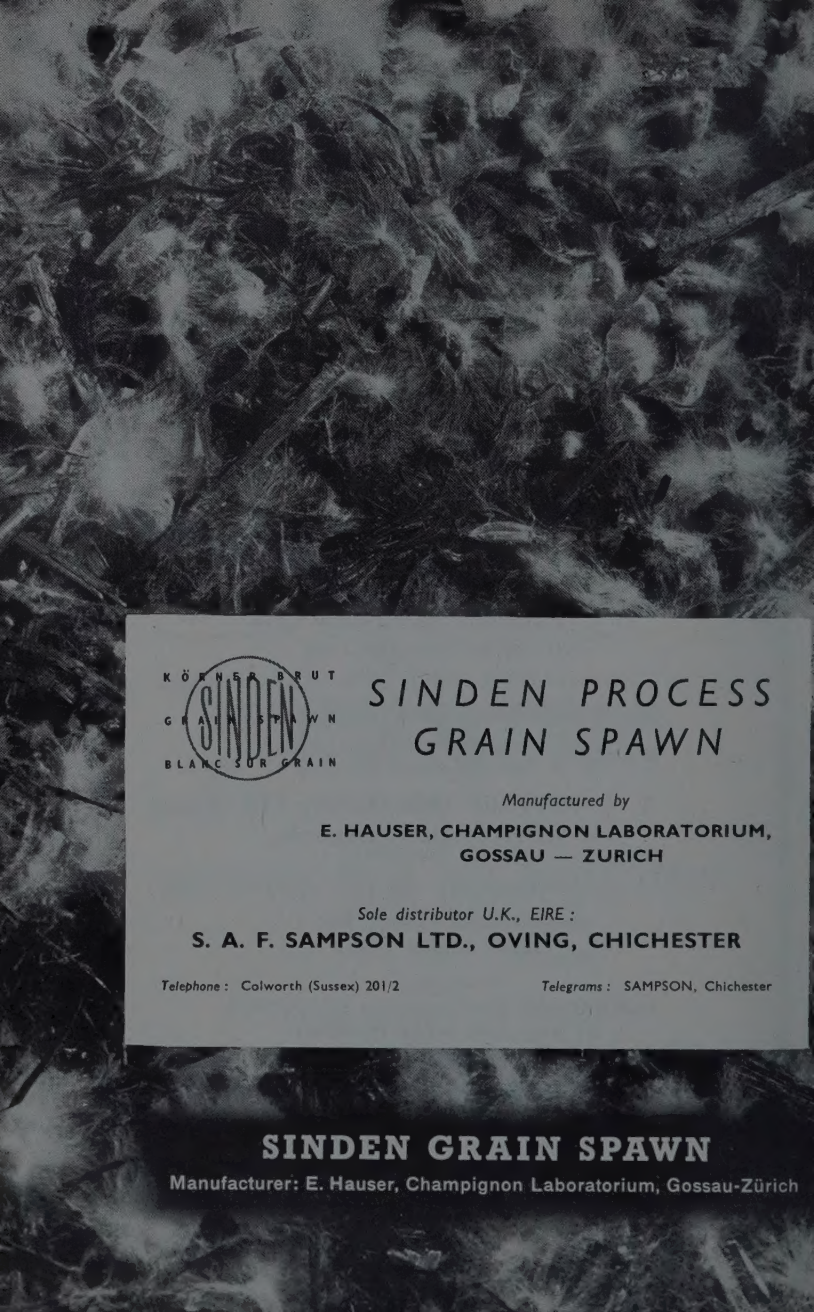

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EDITORIAL

THOSE INCREASED SUBSCRIPTIONS

I am pleased to be able to tell you that the meeting of members at Eastbourne last month fully approved the recommendations of the Executive Committee to raise MGA subscriptions without delay.

At first glance it may seem a little puzzling that I should say I am pleased. My pleasure comes from the fact that those present at the meeting did not question the need for the rise and, in fact, there was quite a strong body of opinion who thought that your committee had not gone far enough with the proposed increase. However, the matter had previously been given much consideration and the increases asked for were felt to be sufficient.

As the last Bulletin Editorial explained, the £ to-day is worth just 12/- compared with the value of the £ when the old rates of subscription were fixed as far back as 1946. It is, I think, quite remarkable that the need to increase revenue has been successfully resisted for so long.

I hope therefore that all members, large and small, will continue their support and will find the MGA of even greater value in the future than they have in the past.

The January issue of the Bulletin will see the first of a series of special digests of news and information concerned with the mushroom wherever it is cultivated. These items will be collected and collated from international press-cutting agencies, and a team of abstractors and translators is being assembled in a number of countries in the hope that world-wide coverage will be achieved. Obviously this alone will cost money—but it should prove of inestimable value to all progressive growers.

I cite this *Digest* as one example of increased service to members. I hope there will be many more.

G. W. BAKER (*MGA Chairman*).

And now Fred. C. Atkins discusses . . . . . .

LA FRANCE DISEASE

My recent attempt to rationalize the diagnosing of Mummy and Fusarium Disease were intended to clear the ground for a résumé of the characteristics of La France Disease, which lurks in our dreams, the more dreaded because it is so intangible.

In England we were not unduly concerned until we heard from Dr. J. W. Sinden and Mrs. E. Hauser in 1954 that La France was causing loss on at least several farms in this country. " We don't know why suddenly it spread around England last summer and fall (1953)," they told me, " but we have evidence that it has been endemic in your country for a number of years."

And Sinden, speaking at the Brighton Conference in 1955, said it " is a very dangerous adversary. We cannot tell whence it comes or how it is carried, but once present it can spread like wildfire, and ordinary sanitation has not excluded it nor eradicated it."

There was widespread alarm. The newly-constituted MGA Research Committee approached the Agricultural Research Council and the Glasshouse Crops Research Institute at Littlehampton, where Doreen Gandy was already engaged in a survey of losses which might or might not be attributable to La France Disease. That survey continues.

In *Mushroom Science I* Sinden and Hauser state that in the outbreak which gave La France Disease its name the first flush on half the house was missed and there were a " few straggling mushrooms at the second." Mushrooms which appeared during the third flush died when only half grown, and then cropping ceased altogether " in rapidly spreading areas."

Affected mushrooms grew singly rather than in clumps. Their stalks were very thin and long, and their caps thin-fleshed and rounded. " They died in a rather soft rot turning slightly brown, but not dark. No foul odour was noticeable but the mushrooms did not have the corky texture associated with the Mummy Disease. Dead specimens kept for two days became slimy with bacteria and rapidly decomposed."

The disease spread within two flushes to the previously uninfected half of the house, where the same course was observed but with far more mushrooms appearing in the break after infection appeared.

At the second flush the spawn was dying rapidly; the compost had " a reddish appearance, and the strands of mycelium were slightly brownish." The damage was sometimes " somewhat similar to that ascribed to nematodes," but nematodes were " not the direct cause for the cessation of mushroom production."

" Examination of the compost, the dying mycelium and the affected mushroom did not reveal the presence of any definite foreign organism . . . . . The rhizomorphs were not all dead, but growth from them was very slow, being confined to short sections."

Those were the recorded symptoms observed in March, 1948, in the mushroom house operated by the La France Brothers at Upland, Chester County, U.S.A.

Another scientist who visited the La France plant at the same time was Dr. E. B. Lambert. Subsequently he wrote: " The beds were producing clothes-pins and dying off after a break or two. The mushrooms were long, thin-stemmed, with small caps, and it seemed to me that the spawn was disappearing in the beds a great deal more rapidly than normal. I do not believe that the symptoms in La France's houses were the same as those of Mummy, and it seemed to move around in the house too rapidly to be considered the results of nematode damage. Since I was not thinking in terms of nematodes at that time, I can't be fully sure of this."

Perhaps we may clarify three aspects of the problem:

1. It was mentioned that the spawn died. It *did*, in the Upland case initially investigated by Sinden and Lambert. Later, at the De Benedetto plant, the spawn remained apparently healthy. In other words, the spawn may die, since once it did; but it does not *necessarily* die.

2. Eelworms have been present in some instances only, and then not in sufficient numbers to cause such damage so rapidly.

3. There is reference in the Sinden-Hauser paper to " the differential response by the different kinds of spawn, one of two planted in the same house being immediately affected but not the other. We now know that Jim La France had had this trouble before, and in this instance had used picking baskets from an infected house to carry the suspect spawn into the new house. So the spawn, too, is exonerated.

Unfortunately, during the " Great Scare " of the past year or two further " symptoms " have been suggested, though not by Sinden and Hauser:

1. There are several different stages of the disease.

2. Bent stems (*not* tilted caps, as in Mummy and perhaps Fusarium Disease) are common.

3. The condition known as Gill-less or Open Veil is a later stage.

4. Mushrooms on infected beds *do* sometimes clump, and some of those in the clumps turn a dry, burnished brown when the disease appears in the first break.

5. Compost just below the affected mushroom looks as though the casing has been over-watered, although in fact it has not.

I consulted Sinden on these five points. He was most helpful, and has allowed me to quote his reply: " Symptoms one and three should be discounted. Number two might occur on affected beds but is not a constant characteristic. From later observations than were reported in *Mushroom Science I* I should say that clumps of mushrooms could occur in the first break (but not be a dry, burnished brown), but not ordinarily afterwards. The whole compost often becomes very wet after the disease is well established, probably because of the autolysis of the mycelium. This differs from the effect of over-watering where only the top layer of the compost usually becomes brown and wet looking."

So we are left with the following characteristics of La France Disease:

(*a*) A reduced or scattered first flush of mushrooms with round, thin-fleshed caps on very thin long stalks, dying when half grown in a rather soft rot, turning a light brown.

(*b*) The next flush producing mushrooms which tend to appear singly rather than in clumps, and which die similarly.

(*c*) Texture of affected mushroom not corky, as found in Mummy Disease.

(*d*) No foul smell.

(*e*) Production of mushrooms ceasing altogether in expanding areas, spreading quickly to all beds in the same house, even though not in direct contact.

(*f*) Extremely slow and weak growth of cultures made from the rhizomorphs in the compost.

It is Sinden's opinion that the disease remains very difficult to diagnose from external symptoms, and that many reported instances have been erroneously identified as La France. He contends it is necessary to culture rhizomorphs " to be sure, or more certain at least, of the presence of the disease."

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Although appearance alone is not sufficient for the diagnosis of La France Disease, this photograph gives a good *general* impression of the symptoms. But every grower who finds a few specimens which he thinks correspond to the picture should not rush to the conclusion that his plant is menaced with the disease; similar types may come from other causes. Sinden adds: "The disease is a complex of progressive symptoms of which such mushrooms may be one, if they are widespread and followed by total cessation of further production."

MUSHROOM RESEARCH AT THE GLASSHOUSE CROPS RESEARCH INSTITUTE

By F. W. TOOVEY
(*Director of the Institute*)

I am very grateful to the Association for honouring me with an invitation to attend their annual exhibition and conference and for giving me the opportunity of talking to you about mushroom research at the Glasshouse Crops Research Institute. I know there is some anxiety in your minds as to what is happening there, and I hope it may be useful if I tell you frankly what the present position is, and mention something of our plans for the future. It is now just over two years since the Yaxley station was closed down, and there has been a tendency to feel—quite understandably—that this period has been almost a complete void as far as mushroom research is concerned. I hope to show, later in my talk, that despite the many difficulties we have been facing at Littlehampton, this is far from being the case.

Perhaps you will forgive me if I begin on a rather personal note. It was only at the beginning of last month that I took over the directorship of the Institute from Dr. Bewley, who had so ably conducted the affairs of the previous research station at Cheshunt and of the new station at Littlehampton for nearly forty years. Fortunately I had a few months previous to that working at the Institute and learning something of the wide range of problems that it has been set up to tackle. Coming to it as I did from a vastly different field of research there was of course much that was new and a very great deal to learn. And you will readily appreciate, I am sure, that in such a relatively short time, and with no previous knowledge or experience of the crop in question, it has only been possible to form some rather general ideas of the future direction of our research effort as far as mushrooms are concerned.

Before going on to mention these ideas I should like to say something about the place of mushroom research at the Glasshouse Crops Research Institute. According to our Articles of Association the object for which the Institute has been set up is as follows:

"**To promote scientific research on the cultivation of glasshouse crops and mushrooms, and of bulbs, flowers and shrubs grown in the open, and on matters ancillary thereto.**"

Well, that covers a pretty wide field, and you may be wondering how much attention we shall, in practice, be able to give to the problems of the mushroom industry. As with all our work, we have to try and get things in perspective, and in peace time the most important criterion on which we can base the weight of our research effort is the economic value of the industry concerned. Here, unfortunately, we are up against a difficulty in that it is not possible to get all the figures we should like, but there is no doubt at all in our minds that the mushroom must rank very highly among the many crops with which we have to deal.

You may take it, therefore, that mushroom research will take a very high place in our programme, and we shall tackle the problems of the mushroom industry with all the energy that our available resources will allow.

If we may revert for a moment to the quotation I have just made from our Articles of Association you may have been a little surprised, as indeed I was myself at first, at the wide range of apparently unrelated crops with which the Institute has to deal. On the surface, it does seem rather a hotch-potch, and there doesn't seem any underlying common factor which might give some unity to our efforts. The greater part of our work, however, must inevitably be concerned with glasshouse crops and mushrooms, and although these may appear to be rather unrelated they are in fact similar in that they demand some control of the growing conditions, or of the environment as we term it, for their successful cultivation. The Glasshouse Crops Research Institute may therefore be looked upon as an organization set up largely for the study of cropping under controlled environment. I think this is an important conception, and I make the point because I do feel that at Littlehampton it is very necessary for us to integrate our mushroom research with the rest of our research effort. We must guard against any suggestion of our mushroom research team forming a little enclave on their own, a sort of institute within an institute. I am sure it will be all to the good if our mushroom research becomes thoroughly absorbed with the rest of our programme, and we shall then find that our other research departments will be making a valuable contribution to mushroom research even though not actually working with mushrooms as a crop. In this way the move from Yaxley will have led to a strengthening of the effort put into mushroom research, and it will not be sufficient to measure that effort solely by the two or three scientists at Littlehampton who give the whole of their time to mushroom problems.

Perhaps I may just amplify this a little. One of our research departments at Littlehampton is that devoted to plant physiology. This department is not at the moment concerned in any way with mushrooms, but I am quite sure that the studies they will be doing on the variations of environment, particularly the microclimate, in a controlled house, and the technique for such studies that they will be developing will provide an invaluable source of knowledge and experience for the mushroom workers. Similarly we may hope that our Crop Protection Department, in their work on insecticides and fungicides, will be developing and testing materials that will be of interest to the mushroom grower in controlling pests and diseases. Each of our research departments, in fact, will be adding their quota to our mushroom work.

What, now, has been happening since the Yaxley station closed its doors on 30th September, 1954? The probable trend of events was foreshadowed in the Chairman's Preface to the Final Report from the Yaxley Research Station. After brief periods of secondment to Rothamsted and Wye which I am sure will have given them most valuable experience for their future work, Mr. Flegg and Miss Gandy took up duty at the Institute about half way through last year and were provided

with laboratory facilities on a scale similar to that provided for other members of the Institute's research staff. To provide a growing house in which the crop could be studied under normal cultural conditions, the old mushroom shed which had been in use at Cheshunt was moved to Littlehampton and set up in time for a first crop to be started early this year. This was to bridge the gap while the new experimental houses were being provided. The old Cheshunt house is perhaps not entirely satisfactory for experimental work, but it has been put to quite good use during the past year and two series of experiments have been conducted in it.

We have prepared a few notes on the laboratory investigations and cropping experiments that have been carried out at the Institute during the past eighteen months and presented them in the form of a hand-out which may be obtained at the Institute's stand at the Exhibition. The work will be described more fully in the Institute's Annual Reports in due course. In the time available to me I can only run over the work very briefly, but if you are interested and would like further information I would ask you to consult the staff on duty at the Institute's stand.

One of the first tasks that our two Yaxley workers, Mr. Flegg and Miss Gandy, set themselves when they joined us was to define the normal mushroom. At first glance this may appear to be a very academic exercise, but it is in fact of considerable importance. With any crop it is desirable to know the limits of variability of the plant material before commencing any serious work on it, and with the mushroom it is particularly necessary because of the abnormalities that sometimes occur in commercial culture. As you know, these abnormalities seem to be becoming more frequent nowadays, and they cause a great deal of concern to growers because they are so often associated with reduced cropping. Obviously one cannot start talking about abnormality until one knows what is normal, and by carrying out a large number of measurements on many hundreds of apparently normal mushrooms Mr. Flegg and Miss Gandy have now been able to set numerical limits to normality. I think you will be interested in the graphs and diagrams on display at the Institute's stand, and we for our part will be interested to have any views growers may care to offer on our conception of the normal mushroom. Mr. Flegg and Miss Gandy presented their work in the form of a paper for the Third International Conference on Mushroom Science, and their paper includes reference to measurements they have made on abnormal mushrooms produced under various growing conditions. These studies have made it possible to draw up a provisional classification of the abnormalities so far encountered, and this will be of great value in the investigation of " La France " disease and similar disorders in which a distortion of the mushroom fruit body is one of the symptoms. Miss Gandy has made a study of several outbreaks of suspected " La France " disease on commercial holdings, and some of her work was published in a paper in Plant Pathology at the end of last year. She has been continuing her work with cultures of mushroom mycelium obtained from affected crops; these have been examined in the laboratory and used for cropping experiments. The symptoms observed in the various outbreaks have not yet been

reproduced under experimental conditions, but the cultures have shown abnormal growth and cropping rates.

Mr. Flegg has been giving much of his attention to the casing problem, and he has published a very useful review of present knowledge on the subject in the Journal of Soil Science. One of the most interesting findings from his recent work is that the salt content of the casing soil appears to affect the number and size of mushrooms produced, and when the salt content is too high the yield may be much reduced. This will certainly need to be followed up. It would indeed be a most interesting thing if the pC factor were found to be of just as much concern to the mushroom grower as it apparently is to the glasshouse grower, and it would fully justify the fundamental work on the pC question that we are hoping to do as part of the general programme of our Chemistry Department.

So much for the work we have been doing with the facilities available to us at present; and talking of facilities I know that there is considerable disappointment that the special mushroom buildings which we have all been so eagerly awaiting have not yet materialized. These things are bound to take a long time, however, as in these days only the most carefully and efficiently planned scheme is likely to receive Treasury sanction. It is time well spent as the more care and thought that is put into the initial planning the less time will the subsequent building operations take. The position at the moment is that the unit has been planned almost to the last detail, and the architects are putting the finishing touches to the scheme so that the bill of quantities can be prepared. We then go out to tender, and after that seek the necessary financial approval. To growers who have had experience of putting up mushroom sheds for their own use it may seem a rather long-winded business, but there is of course all the difference in the world between putting up a few commercial houses of relatively straightforward design and planning an efficient research unit which shall stand the test of time. One of the things that has rather held us up has been the need to link up the heating arrangements of the mushroom research buildings with those of the special purpose glasshouses, as we call them, which are being erected for general glasshouse research. Both sets of buildings will take heat from the same source, and we have had to make sure that the mushroom houses can obtain all the heat they need, at the time they need it, without prejudice to the requirements of the special purpose glasshouses, and *vice versa*, of course. This has raised questions which could not be settled until the heating engineers for the special purpose glasshouses had been appointed. Fortunately we have recently received final approval for the special purpose glasshouses, and building operations have already commenced. They are therefore no longer a limiting factor in the situation.

I have gone into this matter rather fully as I know that everyone's thoughts are on it, and I want to explain the position as carefully and as frankly as I can. Do not let us get things out of proportion however. The new mushroom sheds are very desirable—indeed essential—and nobody is more anxiously awaiting them than we are ourselves at Littlehampton. But they will, after all, be only a part—although a very

necessary part—of our research facilities. Do not let us overlook the fact that so much of research is conducted not just in growing houses, but in laboratories, in libraries and, above all, in men's minds. The first essential for any research programme is of course man power, and here we are very fortunate indeed in having two of the former Yaxley staff, Miss Gandy and Mr. Flegg, whom you all know so well, with us at Littlehampton. They bring to us a wealth of experience, both on the practical and research sides, which we need so much at this stage. Recently there has joined us, as Head of our Entomology Department, a very experienced entomologist, Dr. N. W. Hussey, who has already interested himself in mushroom pests and learned a great deal about them. Some of the preliminary work he has initiated is outlined in the paper that I have mentioned which is obtainable at the Institute's stand. It has become very clear, however, that with their other important commitments it would not be possible for Dr. Hussey or his limited staff to give sufficient time to the study of mushroom problems, and we have therefore obtained special approval to appoint another entomologist to strengthen Dr. Hussey's team so that his department can undertake really serious work on mushroom pests. The selection of a man for this appointment has just been made, and we hope he will be able to set to work within a very few weeks. Thus a rather important gap in the research set-up we inherited from Yaxley will have been filled. I should mention that this special appointment has entailed a sacrifice in other directions, but we felt that the importance of studying mushroom insect problems justified it.

Now, what of our programme? Here again we are very fortunate in having the foundations laid for us by the fine work done at Yaxley. For a research station that had such a short history—no more than nine years - a remarkably full and useful programme of experimental work was carried out there, and we shall of course draw fully upon it. It has been my great pleasure to meet the former Director of that station, Dr. Edwards, and to discuss with him some of the problems in mushroom research to-day. I have also studied the article he published in the Association's Bulletin last June* in which he committed his thoughts on these matters to paper. It is particularly valuable to have the views of one who after years of experience in the research field has become a grower himself. I find myself very largely in agreement with Dr. Edwards' estimate of present-day research needs, and I think the direction we are now taking at Littlehampton is very much in line with his ideas. Dr. Edwards stresses the urgency of dealing with the possible causes of crop failures, and quite rightly so because the threat of such failures must be a constant nightmare to growers. When we came to consider this matter, however, particularly from the entomological angle, we found there was some uncertainty in our information. What **are** the most important pests and disease? There are many that are known, but we cannot hope to study all of them with any thoroughness. Obviously we must concentrate our efforts, but on what? As regards pests, the fashionable one at the moment appears to be Cecids,

* "What do we want from research" by Dr. R. L. Edwards, MGA Bulletin 78, June, 1956, pp. 180-2.

but last year I believe it was Phorids, and always there is the menace presented by eelworms. Which of these should we give priority to? The Cecid problem is a particularly intriguing one, but the unravelling of the paedogenesis story might take up almost the whole of our entomological effort. Should we be right to give it so much attention? Similarly, in the disease field, "La France" and other mysterious disorders are in everyone's mind, and Dr. Edwards refers to sorting out the "unholy muddle" presented by them. Should we be wise to get ourselves involved in this when there may be other questions which our microbiologist might more profitably tackle? We decided we must do something to clarify the issue, and to this end we have sent out a questionnaire, a copy of which I hope you will have received with your November Bulletin, seeking information on the pests and diseases which affict you and also asking for details of your cultural practice so that we may see whether there is any apparent association between the troubles reported and the conditions under which mushrooms are grown. This, I understand, is merely repeating an exercise that was carried out at Yaxley some three or four years ago, but we felt it was time it was done again and in a rather more extended form. *We attach a great deal of importance to this questionnaire, and I do hope you will all make the effort to complete it as carefully and as accurately as you can and send it in.* I know that it will cause you a certain amount of trouble, but we have tried to make it as easy as we can for you, and you may rest assured that by providing us with the information we are asking for you are making a valuable contribution to our research effort. To that end you will be, indirectly, serving your own interests. I am pleased to say that although it is no more than a fortnight since the questionnaire was put out we have already had a gratifying response and some interesting replies have been received. By the time I left the office yesterday 36 copies of the questionnaire had been returned to us. **To make our enquiry really worthwhile, however, we shall need at least a hundred replies, and preferably two or three hundred.** So please go to it, those of you who have not done so already. If you find any difficulty in completing the form our staff at the Institute's stand at the Exhibition will be very willing to help you. As soon as we feel we have received as many replies as we are likely to get we shall summarize the data and make the more important information available to the Association for publication in the Bulletin.

The questionnaire is important, as I have said, and we hope to learn much from it. **But there is always a risk in an enquiry of this nature, that the more spectacular and more obvious problems will be emphasized to the exclusion of those which although no less important may not strike the grower so forcibly.** The grower is quite naturally impressed by the *possibility* of crop failure from pests and diseases and by the day to day difficulties he meets with in his cultural practice, and he will naturally put these at the head of his list of problems. He may be less aware of other factors which may possibly be causing an important and regular reduction in his cropping capacity. We hope not to lose sight of these latter problems, but insofar as they may be tied up with questions of composting, casing and cultural conditions generally their study will

almost certainly involve some very long term research of a fundamental nature. The term " fundamental research " is a rather frightening one for the practical man who wants a quick answer to some of his immediate problems, but I don't think anyone concerned with these things would question the view that the time has come when we need research of this nature. It is precisely to provide facilities for this purpose that the Glasshouse Crops Research Institute has been set up, but let me hasten to add that we shall always aim to have in progress a well balanced programme of fundamental investigations of a long term nature and more practical experimentation of the kind designed to provide early answers to the growers' more immediate difficulties.

In conclusion, I should like to make a further reference to the Chairman's Preface to the final Yaxley report. He expresses the hope that a mutually-satisfactory liaison will be established between the Mushroom Growers' Association and the Governing Body of the Glasshouse Crops Research Institute. I am happy to say that this is indeed the case. **Your Association has set up a Mushroom Research Sub-Committee, consisting of three practical growers and two well-known scientists of the National Agricultural Advisory Service, which the Institute will consult when drawing up its research programme.** Growers may therefore rest assured that their interests and problems will always be taken fully into account in planning our research programme.

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FARM MECHANISATION

By J. STEWART-WOOD
(*Aylesbury Mushrooms Ltd.*)

Mr. J. Stewart-Wood has long been accepted as one of the most progressive tray system growers in this country and his lecture was listened to with much attention. Interest was added to the occasion by the lantern slides and the film which clearly demonstrated how the lecturer himself reduces manual work on his two farms to the very minimum, thus saving both time and money.

There were, he said, two points of considerable importance which must be borne in mind by growers before any decision could be reached as to the use of tractors and the larger types of turners, cranes, manure grabs, etc. The first consideration clearly was that of space for machines; especially the larger ones, could not be used safely and economically in a confined space. It was to provide this freedom of movement that, on both his own farms, composting took place in the open.

The second important point was that of surface on which the machines were required to work. Machines like tractors with fork lifts soon churned up any surface other than concrete or something similar. A composting yard, therefore, with a well laid and drained surface was an essential. Such a yard could be quickly cleared and cleaned up after every operation, using a tractor fork fitted with a scraper.

Mr. Stewart-Wood said he preferred combined straw as it was already well broken up and more easily absorbed the requisite water. The bales were simply untied and the straw put through a turner which, in turn, quickly tore the straw to shreads. The straw was subsequently given a heavy watering every day for ten days by which time fermentation had begun.

Having regard to the fact that composting was in the open stable manure at the rate of one part in three was added to the synthetic compost to ensure that the compost got away to a good start with fermentation. It was most important, when using mechanical aids, to get the materials well watered beforehand as this speeded up the work enormously.

A team of three men, two on stack building and one driving the tractor, could stack sufficient compost for 5,000 sq. ft. in about two hours " on my farm," he said. If extra water had to be added then an additional man would be required and the operation might well take double the time in spite of the extra man in use. The manure turner illustrated was a Salopian converted and power was provided by the power drive on the tractor. The only work done by hand was confined to firming the sides and shaping the stack. In the film (shown later) this whole operation was being carried out by one man using a mobile frame.

Mr. Stewart-Wood then described the final turn, with the complete composting outfit consisting of two tractors and the turner, when the finally complete stack of compost was piled in the shape of a cone. For

this final operation only two men were needed, bearing in mind that the tractor supplying the power drive demanded no attention. One man was needed on the remaining tractor to feed the turner and the other man was adding the final activator.

Roller conveyors were used for filling and for emptying, and with regard to filling it was clearly shown that the trays, on the conveyor, were at the exact height to eliminate any undue movement on the part of the labour so engaged. The team for this filling operation consisted of seven people. A boy or girl loading the empty trays on to the conveyors, three men tray filling, two firming the compost in the trays and stacking them on pallets for removal to the heat room by fork lift truck. With this team and method 5,000 sq. ft. were filled in four and a half hours. By using a fork lift truck the heavy manual labour in mushroom growing was practically eliminated, for the only time the trays were touched by hand was when they were placed on the conveyors and taken off and stacked on pallets. There was no pushing of filled trays for these were stacked at intervals beside the compost heap ready for the fork lift to take away.

Slides showing pictures of the heat room emphasised Mr. Stewart-Wood's firm conviction that plenty of air space is needed between trays. The lecturer explained that air circulation was in force and that air was changed or re-circulated between 10 and 12 times every hour throughout the peak heating process, thus ensuring an even temperature in the room from top to bottom. He pointed out that remote control thermometers were used for checking bed and air temperatures and he laid stress on the need for physical and pH testing " before I am satisfied that the process is satisfactorily completed."

He used chalk and peat for casing with the peat being first broken up and then placed in a tank of water to soak for a few days. The chalk was mixed after the soaking and when the peat was ready for loading. Chalk and peat were placed in alternate layers and shovelled on to an elevator. When the drop into a lorry took place the mixing was complete. Again the use of an elevator took the backache out of the work.

Going on to deal with the growing houses Mr. Stewart-Wood laid emphasis on two further points, the use of blocks to support the end trays (instead of cumbersome frames) and the use of miners' lamps in connection with picking. The trays, too, were stacked only four high thus ensuring the need for working only at ground level for, he said " as soon as a worker has to start climbing or lifting at increased height he immediately begins to lose efficiency." He went on, " Many people think that they must fill every inch available even right up to the ceiling but I feel this is a grave error." He explained that at his Aylesbury farm, when he changed from shelves to trays, it meant the stacking of trays to a considerable height—a back breaking job—but even this was better than " the hard and terrible job of filling shelves with hot compost." In order to do away with some of the hard work and lifting the cropping area in a 2,000 sq. ft. house was reduced to 1,800 sq. ft., " and the same total output was achieved in spite of the reduced bed area. This has happened to other growers as well," he said.

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WORKING DIMENSIONS OF MANURE TURNER:
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ENGINE:
Perkins P4 Diesel. Bore 3½". Stroke 5". No. of cylinders 4. Swept Volume 192.4 cu ins. 3.15 Litres R.A.C. Rating 19.6. Setting 1,250 r.p.m. 29 b.h.p. Max. working torque in lbs ft. 123 (17.0) Kilogrammetres in brackets, at 1,000 r.p.m. Fuel consumption (.86 SP.GR.) .26 pint (.205 litre). Firing order 1, 3, 4, 2.

149. At the bar, and in rather more than jovial mood, Mr.——— blurted out: "EAT MUSHROOMS AND BEGIN TO LIVE." He was, I'm afraid, incapable of realising that he'd created an excellent publicity slogan.

150. " Carry-in " of disease, etc., may be partly explained by the following item I found in " The Chemistry of Micro-organisms " by Arthur Bracken: " Other locations in which micro-organisms are found in great numbers are various parts of the human body, especially the skin and its outer clothing."

151. We often get a very fluffy moisture mould on top of the compost after spawning. In one house this fluff is covered with a deposit of a vivid pink powder said to be *Sporobolomyces*. The same thing has apparently been seen on freshly arrived cartons of grain spawn. It is, seemingly, harmless; but it looks most devilishly dangerous. It certainly adds colour to our monotone-ous job.

152. The final word in the now-dead " Pinheads v. Scientists " controversy came oddly enough and most satisfactorily from the " enemy." " The rut of theory," quoth he, " is a very deep one." Who was it? Sorry, the gentleman pleaded with me not to give him away.

153. In one of the " cave " films at Eastbourne mushrooms seemed to be growing in remarkably unnatural symmetry and pattern. Too good to be true, I thought. It reminded me that I must, after 20 years, publicly confess that for a press photo of my first crop I deliberately " transplanted " many mushrooms in order to make a good show, being careful however to avoid symmetry! If politeness were expected of me I would suggest that nobody has ever thought of this idea before or since, in any connection whatever!

154. The Eastbourne Conference was on the whole a success, though I missed too many well-known faces—I wonder why. They've only themselves to blame for missing something too—Rasmussen's lecture. There was enough meat in this, as in Sinden's lecture last year, to last us for many months to come. This is the sort of thing growers want; we can't have too much of this severely practical stuff. Now what about Southport next October? Is there a volunteer—from any part of the world—who will offer to give us some more of this sound healthy treatment? You don't need to have a great name; if you have a vital, practical subject your name will be made and your future success assured.

155. **A few Eastbourne sidelights.** At dinner the first night: *Guy de Man:* " *Excuse me pleece, I must go outside to put away my car.*" *Rasmussen:* " *Excuse me, I must go to Denmark to close my vents.*"

I liked the phraseology of Jacques Roca from Barcelona who told me, " This Conference for me is the best of the best." It was informative, he said, to learn how mushrooms grow in England: " For me, I spend 48 hours a week picking mycogone and the price of it is so very low."

A grower told how his La France reminded him of the middle aged lady who lamented, " There is a destiny which ends our shapes."

It could of course be none other than Capt. Lawrence, who, after dilating at length on the virtues of sound construction and insulation, said, " In my houses condensation falls down when a match is struck."

THOUGHTS ON CROPPING

"O Tempora! O Mores!" *

Cicero *might* have been declaiming at a Farm Walk, instead of denouncing the the Cataline conspiracy! What times indeed—a mushroom grower's life is nothing but a protracted schedule. He composts in 10 or 20 days, he pasteurises for 2 days. He crops for 6 weeks or 16 - and when it comes to testimonials for 100% Productive Spawn, then it's 1 lb. in so many days or 3 lb. in ten weeks!

And – talking of customs – Cicero might well find some odd ways of doing the job, that have been handed down from father to son since Roman times. Every grower has his own ideas about the right way to cultivate mushrooms!

In searching for something enduring in those troubled times, how Cicero would have longed for a bedrock like 100% Spawn. At least growers to-day have *that* to fall back on, as the world appears to tumble about *their* ears!

* *What times! What customs!*

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PRODUCTIVE, PURE CULTURE
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MGA RAISES OVER £1,000 FOR

HUNGARIAN RELIEF FUND

A number of members were unable to attend the Eastbourne Conference and Show for various reasons. Some I am sure were prevented by having to market particularly heavy flushes and others were probably busy turning a pile of compost, so were not aware of what happened. But quite a number of those staying at Eastbourne for those two busy days, attended the dinner and dance.

To those very generous members and friends at Eastbourne, goes the credit for answering a spontaneous appeal by me for help for the Hungarians and the magnificent sum of £1,000 was subscribed and this may reach 1,000 Guineas when the final figure is published.

I asked for mushrooms to be given—knowing full well that it would be useless sending these to Hungary and mushrooms sent to market would have deteriorated beyond recognition. Members were asked to state on a piece of paper the number of lbs. they would give and asked to send these mushrooms to their own markets and send me the money they realized. Many present generously paid on the spot in anticipation of the return they would get from the market and within 10 days 90% of the money was in.

I have personally acknowledged all donations, but would again through the medium of the *Bulletin* like to express my gratitude for the support given to the appeal and would like to make this magnificent response known to all members of the Association.

During the dance a cheque for £250 was given to the Mayor of Eastbourne for the Lord Mayor's Appeal and £250 to the British Red Cross Hungarian Relief Fund. The balance to date has been paid to the Lord Mayor's Fund via the NFU.

Footnote:

A bottle of Hungarian Brandy was reclining in the Winter Garden behind one of the trade stands. At midnight the owner gave it to be auctioned, but the Winter Garden was locked up for the night. The Mayor went out and returned to the Grand Hotel triumphant with the bottle. Result—the bottle made £21, was given back and made a further £20. Thank you donor, purchasers and " Mr. Auctioneer."

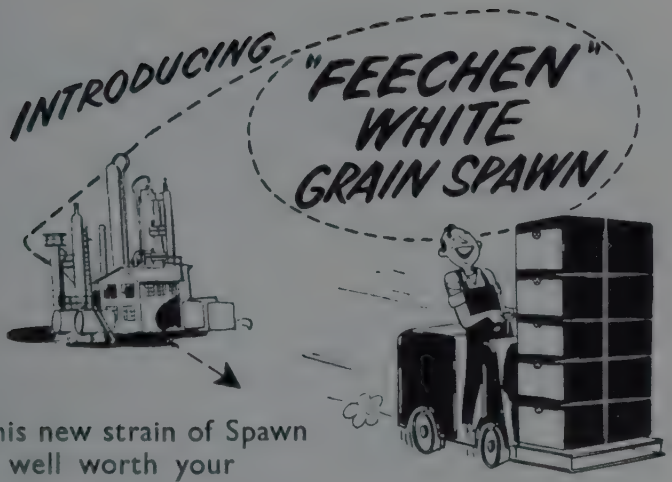
G. W. BAKER (*MGA Chairman*).

REFRESHER COURSE—NO EXHIBITION

After thoroughly discussing the matter the MGA Executive Committee, at the November meeting, decided not to go ahead with the plans to hold a full-scale exhibition and conference at Southport, during the first week in October, 1957, but instead to hold a Refresher Course, also at Southport, on 2nd and 3rd October.

Plans have not yet been fully settled but it is expected that, in addition to a full series of lectures, there will be working demonstrations of much of the machinery now in use in the mushroom industry.

Full details will be announced later.



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413

A FULL REPORT ON . . . . . .

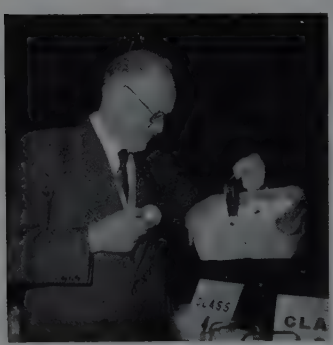
THE EASTBOURNE EXHIBITION AND CONFERENCE

The Fifth Annual Mushroom Industry Exhibition and Conference at Eastbourne, on 14th and 15th November, saw the standard set at previous gatherings of this kind fully maintained and although, by general consent, the number of growers attending was slightly less than last year's record, growers did, in fact, turn out in good numbers and the attendance was satisfactory.

Last year's innovation of inviting growers to get-together on the eve of the show was again a great success. On that same evening growers in good numbers were able to register and receive their identification badges—another innovation which can be improved on another year.

The Exhibition proper opened at 10 a.m. on Wednesday, and visitors were quickly aware that the " open " effect, favoured very much at Brighton in 1955, had been maintained. There was plenty of room for growers to move around and this was appreciated by exhibitors and visitors alike.

Apart from a cooking demonstration by Jean Conil, the world-famous chef, there was nothing to take the attention of growers away from the main hall until the afternoon when, in the Lecture Hall, Mr. J. Stewart-Wood of Aylesbury spoke on farm mechanisation. Prior to this lecture, Mr. F. W. Toovey, Director of the Glasshouse Crops Research Institute at Littlehampton, had given a most clear and concise account of the position of the Institute with regard to mushroom research. Both Mr. Toovey's talk and Mr. Stewart-Wood's lecture are fully reported elsewhere in this issue.



Competition judge, Mr. C. R. Chamberlain has a good look at one entry. Picture by " The Grower."

Meanwhile the mushroom competitions, housed on the stage, had been judged and the competition mushrooms were on display. The entries were a record and quality was up to standard. The MGA Challenge Cup saw that popular combination of Mr. G. W. Baker (MGA Chairman) and Mr. A. D. Jones, of the Broadham Produce Co. Ltd., regain the laurels they first won at Harrogate in 1953, and they also took the Mount and Thwaites Cups. Newcomer to these competitions, Major A. L. A. Dredge of Combe Bank Market Gardens, Sundridge, soon made his presence felt and gained the Broome & Green Cup, and Lindfield Nurseries, last year's winners of the MGA Cup, had some consolation with premier place for the

Smart Cup. There was keener competition for the Stable Manures Cups and the eventual winner was M. C. Jarvis of Culbery Nurseries Ltd., Angmering.

For some little time G. C. Smith of Loddington Farms Ltd., Linton, Maidstone, has been entering these competitions, previously with but minor successes. However, this year he carried off the T. J. Poupart Cup with what was, by general consent, " the finest display of mushrooms ever seen in these competitions." Mr. C. P. Chamberlain, one of the two judges, said quite emphatically that this exhibit was easily the best in the show. Is that an idea for a new cup? Mr. Chamberlain's co-judge was Jean Conil.

With nearly 150 people present, the dinner and dance at The Grand Hotel fully justified this experiment. The dinner followed the Chairman's reception, where Mr. and Mrs. Baker received the guests. At dinner, presided over by Mr. Baker, the chief guests were the Mayor and Mayoress of Eastbourne and Mr. T. Ainslie Robertson (Chairman of the Management Committee of the Glasshouse Crops Research Institute), with Mr. and Mrs. Toovey. Pleasing feature of this dinner was the fact that so many Past Chairmen of the MGA were, with their ladies, accommodated at the top table.

The toast to " The Borough of Eastbourne " was proposed with commendable brevity by Mr. Baker and the Mayor of Eastbourne responded in similar vein and length.

It was at this dinner that Mr. Baker launched his remarkably successful appeal for donations to the Hungarian Relief Fund, an appeal which, in a matter of a few minutes, reached over £800 and was eventually to total over £1,000.

At the dinner, M. André Sarazin from France thanked the Association " for the great honour you have accorded me in making me a Life Member of your Association."

Mr. Raymond Thompson was responsible for the excellent dinner arrangements.

The Exhibition sub-committee had made a somewhat wary approach to the matter of organising the dance in that this was another new departure. Any fears as to the success of the dance were quickly dispelled and everyone appeared to have a most enjoyable time. At the dance Mr. Baker presented cheques for £250 to the Mayor of Eastbourne, and to Mrs. Marion Stewart Hemsley, of the Eastbourne section of the British Red Cross, on behalf of their respective Hungarian Relief Funds. The fund was swelled by an auction of a bottle of genuine Hungarian Apricot Brandy, given by Shirley Organics Ltd. Mr. Brown of that organisation was the first buyer and returned it. Eventually it was knocked down to M. Guy de Man of Belgium and it raised £40 for the fund.

So to Thursday, with the trade show, the cookery demonstrations and the lecture by Mr. C. Riber Rasmussen, head of Danish Mushroom Research. MGA members will appreciate that owing to the length and importance of this lecture it is impossible to reproduce it in full in this Bulletin. **It has therefore been decided to publish it, on behalf of the author, in booklet form and a copy of this will be sent free to all members who attended the Conference as delegates. To others who did not attend**

the price will be 5/- and it is hoped to make the publication available about the middle of December. The delegates paid their 5/- on admission to the lecture.

The cookery demonstrations, which got off to an indifferent start on the Wednesday, came into their own on Thursday, when several hundred people were present at each of the two demonstrations given by Jean Conil in conjunction with the South-Eastern Electricity Gas Board.

The meeting of the MGA members at which an increase in subscriptions was approved is reported elsewhere in this issue.

A short meeting of represenatives of the trade exhibitors was also held and the exhibitors in general voiced approval of the arrangements. The possibility of holding the exhibition and conference in London at some time in the future is to be explored.

The film shows, with films of mushroom growing in Holland, of spawn making, of the Agaric caves at Bradford-on-Avon (which appeared on B.B.C. television) and of the Esso film of the Broadham Produce Co's. farm at Oxted (in colour) attracted large audiences and, without question, greatly added to the general interest in the exhibition and conference as a whole. The films included that speed up run of a few seconds showing the growth of the mushroom—quite a highlight.

Mushrooms were on sale at the entrance to the Exhibition, the stall being manned by representatives of the local British Red Cross. All the profits were for their Hungarian Relief Fund.

Fred. C. Atkins looking a little belligerent when discussing a point with C. Riber Rasmussen (Denmark) and Eric White (N. Ireland). Could it have been pig manure? Picture by "The Grower."

A number of trays of growing mushrooms were on display and these were afterwards collected by the police and delivered to the Chaseley Home for Disabled ex-Service men at Eastbourne who, it is reported, would like to start their own mushroom farm.

Some last minute reflections

It was a splendid idea of Messrs. J. E. R. Simons Ltd. to put up that bottle of grain spawn (estimate the number of grains) for the MGA Publicity Fund. Thank you, Mr. and Mrs. Barrett.

That "performing" seal of Messrs. W. Darlington & Sons Ltd. made its last-minute appearance amongst the followers in the centre of the bar before returning, next day, to the Darlington stand.

"Spotlight" on the S. A. F. Sampson stand was all their own idea.

Those ear-rings resembling mushrooms were the work of Mrs. Ewart who also put on the excellent display of pottery on the Stable Manures stand (Mr. D. Griffiths). Those ear-rings were quickly sold out—"it was quite a last minute idea," said Mrs. Ewart.

Is it really true that the wife of a mushroom grower said, "If I had sticks of celery growing out of my ears my husband wouldn't

notice them?" It could be, if the grower was at a meeting of growers.

The Glasshouse Crops Research Institute staged an excellent display at short notice and many growers paid the stand a visit. There could have been more.

The chip baskets, in some of the competition classes, did not appear full enough – some stalks were on the short side. "Three-quarters of an inch is what the schedule says and that is what they should be," commented one of the judges, Mr. Chamberlain. M. Conil, to assist with his final decisions, got his nose well down towards the exhibits, saying "I think the scent of mushrooms is quite important."

There was quite a good attendance of ladies for the Elizabeth Arden talk at the Grand Hotel.

It was good to see Mrs. Baker looking so fit, especially as she has been none too well since her serious hip injury sustained following a fall at the Third International Conference in Paris last June.

Brian Branston of the B.B.C. visited the exhibition and took a tape recording which was broadcast on the Home Service in the "Farm Fare" programme on 21st November. Those taking part were:-- Mr. Guy Reed, Senor Jacques Roca (Spain), M. Guiochon Junr. (France), Mr. C. R. Rasmussen (Denmark) and Mr. G. V. Allen (MGA Vice-Chairman). Mr. Reed put in some good words on the publicity side, Señor Roca spoke about growing methods in Spain, M. Guiochon told about marketing in France (adverse publicity perhaps since he said that in France mushrooms were retailed at about 3 - per lb.) and Mr. Rasmussen spoke about the Denmark position. Unfortunately the programme was running over time and Mr. Allen was the victim of the cut. Jacques Roca and your Secretary-Editor listened to the broadcast, sitting in a Rolls Royce in Agriculture House car park. Who's car? Mr. S. O. Ratcliff's, Hon. Treasurer to the NFU, who said: "I'm only too pleased to be of use and service."

Messrs. G. W. Baker, G. V. Allen and Raymond Thompson, assisted by Eric Gook, were responsible for the general arrangements, whilst among the ladies, Mrs. Baker, Mrs. Jones, Mrs. Allen and Mrs. Gook again did sterling work.

JUNIOR MGA?

Among matters discussed at a meeting of the MGA Executive Committee, on 27th November, was a suggestion that a Junior Branch of the MGA should be formed.

Any young mushroom growers interested in the suggestion are asked to write to the MGA Secretary giving their views on what they think should be the aims, acitivites and objects of the proposed branch and stating also what part they would be prepared to play in such activities.

EASTBOURNE COMPETITION RESULTS

PRIZE WINNERS, 1956

CLASS 1—**MGA Cup & Miniature:** 1st (Entry No. 5), Broadham Produce Co. Ltd., Oxted, £5; 2nd (Entry No. 9), J. Stewart-Wood, Aylesbury Mushrooms Ltd., £3; 3rd (Entry No. 3), R. J. Hopkins, Hammer Lane Farm, Horam, £1.

CLASS 2—**Mount Cup & Miniature:** 1st (Entry No. 5), Broadham Produce Co. Ltd., £3; 2nd (Entry No. 4), G. C. Smith, Loddington Farm, Nr. Maidstone, £2; 3rd (Entry No. 9), Combe Bank Market Gardens, Sundridge, £1.

CLASS 3—**Broome & Green Cup & Miniature:** 1st (Entry No. 10), Combe Bank Market Gardens, £3; 2nd (Entry No. 14), G. V. Allen, Bilting Nurseries, Ashford, £2; 3rd (Entry No. 7), J. M. Bridger, The Hermitage Gardens, Nr. Mundham, £1.

CLASS 4—**Smart Cup & Miniature:** 1st (Entry No. 9), Lindfield Nurseries Ltd., Lindfield, £3; 2nd (Entry No. 2), E. G. Millais, Crosswater Farm, Churt, £2; 3rd (Entry No. 8), Combe Bank Market Gardens, £1.

CLASS 5—**Thwaites Cup & Miniature:** 1st (Entry No. 3), Broadham Produce Co. Ltd., £3; 2nd (Entry No. 2), A. DeB. Hovell, Church Farm Nurseries Ltd., Rustington, £2; 3rd (Entry No. 4), H. J. Barton, Winter Pick Nurseries, Horsham, £1.

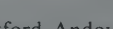
CLASS 6—**Stable Manures Cup & Miniature:** 1st (Entry No. 1), M. C. Jarvis, Culberry Nurseries Ltd., Angmering, £3; 2nd (Entry No. 4), R. Britcher, East Farleigh, £2; 3rd (Entry No. 5), R. S. Francis, Mid-Kent Nurseries, Nr. Tonbridge, £1.

CLASS 7—**T. J. Poupart Cup & Miniature:** 1st (Entry No. 3), G. C. Smith, £3; 2nd (Entry No. 6), Lindfield Nurseries Ltd., £2; 3rd (Entry No. 2), A.DeB. Hovell, £1.

Winners of the competition organized by Messrs. J. E. R. Simons at Eastbourne, for " The Correct Number of Grains of Spawn in Jar," were:—

(1) Capt. G. P. Lawrence of Goodworth Clatford, Andover, £10 (10,142).
(2) Miss Moore of East Farleigh, Kent, £5 (10,140).
(3) Mr. D. R. Ritchie of Maidstone, Kent, £3 (10,250).

The correct number was 10,150. £6.4.6. was raised for the MGA Publicity Fund.



MGA ANNUAL MEETING

The Lunch and Annual General Meeting of the MGA will be held at the Connaught Rooms, London, on Tuesday, 26th March. All members will receive official notification giving times, etc., in due course.

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Many Past Chairmen of the MGA were at Eastbourne and here, at the dinner which preceded the dance, many C. R. Rasmussen (Denmark), Mrs. Allen, T. Ainslie Robertson (Chairman, Management Committee, Glasshous Mayoress of Eastbourne, F. W. Toovey (Director of Research at the Glasshouse Crops Research Institute), Mr Middlebrook, A. DeB. Hovell (MGA Chairman 1949-50), Mrs. Hovell, H. G. Boxall (MGA Chairman 1952-53) are not .

A particularly happy picture of Mr. and Mrs. G. W. Baker here seen receiving the Mayor and Mayoress of Eastbourne at the MGA Chairman's Reception. Mr. G. V. Allen (MGA Vice Chairman) is on the extreme right.

— 1956

upied the top table by invitation. Seen standing (left to right) Mrs. Lawrence, G. V. Allen (present Vice-Chairman), esearch Institute, Littlehampton), Mrs. Baker, the Mayor of Eastbourne, G. W. Baker (Chairman, MG4), the red C. Atkins (MG4 Chairman 1950-51), Mrs. Atkins, Stanley Muddlebrook (MG4 Chairman 1947-48), Mrs. avid Capt. G. P. Lawrence (1953-55) and J. Stewart-Wood (1951-52), two Past Chairmen, were also present but

On his knees at last. Stanley Muddlebrook getting ready down to business. Cup winner G. W. Baker is on the right and another cup winner, Major A. J. A. Dredge (Combe Bank Market Gardens) is on the left.

EASTBOURNE 1956

THEY CAME FROM THE NORTH

Left : An all-Yorkshire party, Messrs. A. A. Spencer, W. Appleyard, H. Hanson (Bradford Fertilizer Co. Ltd.) and H. Stead.

WEST

Mr. and Mrs. A. G. Pointing from Bath.

EAST

Mr. R. H. Pinkerton and party from Rayleigh, Essex.

AND SOUTH

Mr. and Mrs. Raymond Thompson's party includes Mr. Rasmussen, Mr. Rodwell and Mr. S. A. F. Sampson.

PUBLICITY AT EASTBOURNE

The MGA Stand with its backboard of publicity tear sheets from a wide variety of publications. It was arranged by Guy Reed

AT THE COOKERY DEMONSTRATIONS

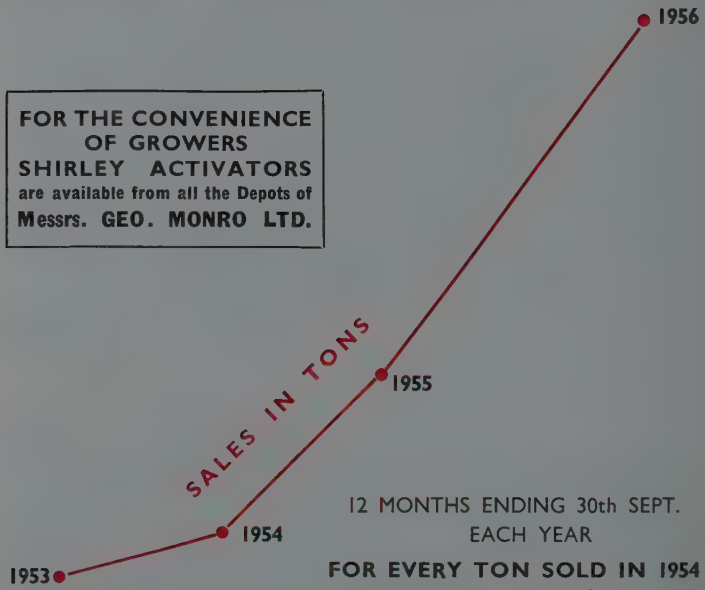
World famous chef, M. Jean Conil is not indulging in a little magic but holds a mushroom.

Some of the audience at our cookery session. M. Conil gave some really first-class demonstrations

OUR SALES CHART
IS OUR
BEST ADVERTISEMENT

BE WISE—USE SHIRLEY
ORGANIC ACTIVATORS & H.O.C.

FOR THE CONVENIENCE
OF GROWERS
SHIRLEY ACTIVATORS
are available from all the Depots of
Messrs. GEO. MONRO LTD.



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AND 9·5 TONS IN 1956

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WILL MUSHROOMS CONTROL CANCER ?

Interim Research Report

Readers of the *MGA Bulletin* will recall that in the December, 1955, Joseph Michaels drew our attention to researches at Michigan State University into the possible control of cancer by extracts from edible fungi. Through our American Diarist the Editor contacted Dr. E. H. Lucas, Professor in Drug Plant Research at Michigan, who writes :

" Regarding your question about a possible link between mushrooms and cancer-inhibiting substances I can only refer to a paper which one of my associates and I presented at the annual meeting of the American Institute of Biological Sciences. The daily press brought reports about this paper, and this is how Mr. Michaels found out about the matter. I am enclosing a précis of this paper from which you will see that we have not worked with the *Psalliota* species which are grown commercially.

"As you see from our report the findings are entirely preliminary, and much more work is needed in order to find out more about the nature of the chemicals which retard the growth of the animal tumors. Furthermore, the application of these chemicals to tumor in man is a logical step which will have to be taken later.

" Work of this kind is slow and expensive and may well take several more years. I wish to thank you for your interest and will place your name on our mailing list so that you may be kept informed on any progress we are making."

The précis to which Dr. Lucas refers is given below :

A SURVEY OF THE OCCURRENCE OF TUMOR INHIBITORS IN HIGHER BASIDIOMYCETES

E. H. Lucas and J. A. Stevens

In 1950 we found that preparations of dried commercially available mushroom (*Boletus edulis*) obtained from Central Europe exhibited tumor-retarding properties in tests against mouse sarcoma 180 which we conducted in collaboration with the Sloan-Kettering Institute for Cancer Research. The consistent activity which was obtained with a large number of samples from different sources prompted us to attempt isolation of the active principle. This work is still underway. A partial report on the chemical studies will appear in the near future in the Proceedings of the Society for Experimental Biology and Medicine.

It was obvious that an attempt should be made to grow this fungus in vitro. The difficulty of in vitro culture of most boletes is well known, and *B. edulis* is no exception. Spores which had been shipped from Europe failed to germinate in spite of various ways of treatment. However, we succeeded in isolating from soils which had been collected in *B. edulis* habitats a basidiomycete which showed the characteristics that Melin (in Sweden) indicated in his publications dealing with the in vitro culture of this species. Subsequently we had fresh specimens

shipped to us through the courtesy of the U.S. Air Force which arrived in comparatively good condition and enabled us to make mycelial transfers, some of which resulted in the establishment of cultures. Isolation of these cultures was made on a modified Czapek agar, and they have been maintained on this medium.

I might say a few words about the identification of the organism. On the basis of numerous tests of specimens identified as *B. edulis* and procured from habitats in the U.S. we can say that the active principle found in the European material has been lacking here. The European type involved is well known to me ; macroscopic characteristics definitely distinguish it from anything described as *B. edulis* in this country. The closest resemblance I have found is that to the specimens shown in the reel of Smith's *Mushrooms in their natural habitats*. We have not been able to obtain a specimen from Oregon as yet. Singer, in *The Boletoideae of Florida*, published in *The American Midland Naturalist* in 1947, is probably referring to this type as *B. edulis*, ssp. *euedulis*, which he distinguishes from the ssp. *pinicola*, the one with which we most likely have been dealing. About this subspecies Singer remarks that the macroscopical characters he has seen in specimens from several European countries indicate that the plant first described by Vittadini belonged to an autonomous subspecies, the European conifer race. He adds that he believed that it had never been found in America.

Be this as it may, the cultures that we obtained grew very slowly and for this reason could not be used for studies that we had planned to conduct in order to obtain tumor inhibitors in vitro.

We assumed that a culture that would grow well enough to produce a sufficient amount of mycelium might also yield a measurable quantity of the tumor-inhibiting principle. In this respect we were reminded of the work of Wilkins in England who showed in a series of papers that antibacterial substances which had been established in the fresh sporophores were also elaborated in vitro.

About 80 species of native mushrooms were collected, the sporophores extracted with water and the preparations tested against Crocker mouse sarcoma 180. Species belonging to eight genera, namely, *Boletus*, *Calvatia*, *Clitopilus*, *Collybia*, *Cortinellus*, *Hydnum*, *Lepiota*, and *Polyporus*, showed inhibitory properties. Most of these species grew well in vitro, on slants, plates and in submerged shake cultures. The production of the active principle that the sporophore extract had shown was, however, possible only in the cultures of *Clitopilus abortivus* and *Collybia longipes*.

The precise conditions under which these cultures elaborate the active principles—we have reason to assume that these principles are different from each other—are still in the process of being worked out. They are being dealt with in Mr. Stevens' thesis. Nutritional studies with *Collybia longipes* have shown that a modified Czapek medium which we are using routinely is providing adequate nutritional elements for abundant growth of mycelium (about 100—125 times the weight of

the inoculum after 2—3 weeks), but not necessarily the elaboration of the active principle.

The identification of our *Collybia* culture is not definite. We considered it to be *longipes* since there were many characteristics that pointed to this fact. However, there are many intermediate forms, which Smith evidently had in mind when he said, in *Mushrooms in their natural habitats*, that the variations of *C. radicata* occurring in North America are in need of critical study. We have tested many specimens of *C. radicata* and intermediates between *radicata* and *longipes* but we have not yet found one that contained the active principles which occurred in the specimen collected in 1953.

It may be appropriate to stress that the survey among 80 and odd species affords a very limited insight into the scope of production and the nature of inhibitory substances in higher basidiomycetes. By comparison with other plants, the higher basidiomycetes are a good source of tumor-retarding substances ; this would encourage a far more extensive search.

THE OFFICERS OF THE MGA WISH ALL MEMBERS, WHEREVER THEY ARE, A HAPPY CHRISTMAS AND A PROSPEROUS NEW YEAR

the world's finest mushroom basket

Designed after consultations with growers, wholesalers and retailers, the Dring Mushroom basket embodies lightness, ease of stacking, rigidity and, above all, the wax impregnated board from which they are made *absolutely eliminates the possibility of the mushrooms being spoiled through the basket absorbing moisture.*

DON'T DELAY ORDER NOW!

DRING

at the lowest cost of any basket in use today

Dringport Works, The Airport, Portsmouth, Hants

DACTYLIUM OR COBWEB DISEASE

By J. A. GATHERCOLE, B.Sc., *The Murphy Chemical Co. Ltd.*

The recently published work, in which several materials were tested against *Dactylium*, has raised considerable interest in the mushroom industry. Of the materials mentioned, pentachloronitrobenzene, commonly referred to as PCNB, was mentioned as being the best of the materials tested. According to the table published at the same time PCNB was considerably more effective than any other material, except one.

The effect of the article has been to raise growers' hopes very high, that at last a material has been found which is lastingly effective. This has tended to prejudice growers against existing materials, at least one of which, when properly used, will give a control for about seven days.

Zineb, referred to in the article as the zinc salt of nabam, was not completely blacklisted. It is of importance to note that with zineb the method of manufacture can and does contribute an important part to its fungicidal activity. No two manufacturers use exactly the same technique and it is a substantiated observation that other chemicals are present to a greater or lesser extent in the formulated zineb.

During the past year, considerable work was done by the writer comparing two different commercial formulations of zineb. Tests were carried out on certain nurseries and mushroom farms using the two materials in adjacent houses and observing their effects on *Dactylium* and *Mycogone*. The two formulations were " Parzate " and " Dithane Z 78."

Eight trials were specifically designed for observations on *Mycogone* alone and two for observations on both *Dactylium* and *Mycogone*. At one of the latter sites *Dactylium* was firmly established, and although a dust formulation of zineb was not able to eradicate the infection, it was considered that the spread of the disease was prevented. At the other site, *Dactylium* was known to be in the ground round about, but was not in evidence inside the houses. The grower attributed this freedom from infection to using zineb regularly. To convince me, however, he generously offered to withhold treatments from two houses nearing the pulling out stage. After 14 days *Dactylium* appeared. Subsequent heavy applications of " Dithane Z 78 " prevented its spread but did not eradicate it. The trial was repeated involuntarily later when a heavy flush took all available labour and the fungicide treatments lapsed. The same effect was noted.

More recent trials comparing PCNB with zineb have shown that " Dithane Z 78 " used as a wet spray will severely check *Dactylium*, but that it will reassert itself after about seven days. This means that if an infection is present, growers can materially reduce the detrimental effect on their crops by spraying with 1 lb. " Dithane Z 78 " per 100 gallons. " Dithane Z 78 " is sold under our trade name as Murphane

MOUNT MUSHROOM SPAWN

1956 SHOW

and OF COURSE
MOUNT SPAWN USERS
WON

4 Cups
3 Seconds
5 Thirds

ALL THE BEST GROWERS
USE MOUNT SPAWN

RELY ON —— THE BEST

MOUNT PURE CULTURE MUSHROOM SPAWN

Distributors : **J. E. R. SIMONS LTD., HARLOW, Essex**
PHONES : POTTER STREET 65, 222 & 223 GRAMS : SIMONS, HARLOW

Wettable. The zineb dust, known as Murphane Dust, used regularly should act as a deterrent to *Dactylium*, but will not be as effective as the wet spray.

An important thing to note is that PCNB is not claimed to be effective against *Mycogone*, whereas the fungicidal activity of zineb against this disease is well-known. Even assuming PCNB to be as active here as in America, it cannot be regarded as supplanting zineb. Growers will have to continue using zineb against *Mycogone*, and this material is also doing a good job on many farms in the prevention of *Dactylium*.

It is easy to be lulled into a false sense of security after using these chemicals. It is not wise to assume that because *Dactylium* is not noticed when zineb is used that it is not present. It has already been pointed out that zineb is not an eradicant, but its protectant value should not be overlooked.

Work is being done to compare PCNB with zineb. If PCNB lives up to its promise, then the effect should be startling. Preliminary observations on the existing trials are heartening, and it is hoped to expand the number in the very near future.

PUBLICITY CONTRIBUTIONS—NOVEMBER	£	s.	d.
A. Williamson (19) Ltd., Smithfield Market, Birmingham, 5. Salesmen	5	0	0
†Reuben Levy Ltd., Spitalfields Market, London, E.1. Salesmen ..	1	4	3
†C. Snowdon & Co. Ltd., Castlefolds Market, Sheffield. Salesmen..	5	14	4
†Wm. Artindale & Son Ltd., Castlefolds Market, Sheffield. Salesmen..	19	5	3
†*Geo Monro Ltd., Hertford Road, Waltham Cross. Sundriesmen.			
†*S. A. F. Sampson Ltd., Oving, Chichester. Spawn Merchants.			
†*W. Darlington & Sons Ltd., Worthing. Spawn and Sundriesmen.			
*†Pinkerton's Scottish Mushroom Laboratories, Millerston, Glasgow. Spawn Merchants.			
*Monlough Food Production Co. Ltd., Ballygowan, Belfast. Spawn Merchants and Growers.			
†*J. E. R. Simons Ltd., Natts Farm, Harlow, Essex. Spawn and Sundriesmen.			

*The amounts collected by spawn merchants are not for publication.
†Previous contributions already acknowledged.

NEW SUBSCRIPTION RATES

A special general meeting of MGA members in the Lecture Hall, Winter Garden, Eastbourne, on Thursday, 15th November, agreed to an increase in the Associate and Grower Membership of the Association. A move to make the increases even heavier than those suggested by the Executive Committee was successfully resisted.

New subscription rates agreed on were:—**ASSOCIATE MEMBERS 2 gns. to 3 gns.; GROWER MEMBERS (1,000 to 20,000 sq. ft. bed area) 6 gns.; GROWER MEMBERS with 20,000 sq. ft. bed area and over 10 gns.**

These new rates will come into force for all subscription renewals on and after 1st January, 1957. Those members who make their renewal by Bankers' Order are asked to make the necessary change with their banks.

As the Secretary is not fully aware of the actual farm bed area of each and every member, the co-operation of all members in the matter of these new rates is earnestly requested.

THOSE BEHIND THE PUBLICITY DRIVE

Listed below are those who, by their contributions to the Publicity Fund, enable some publicity to be given to the cultivated mushroom.

Your Publicity Committee respectfully draws the attention of all members to the firms listed below who, throughout the year, have given steady support to the fund. Their support with that of the growers making regular contributions via the spawn contribution through the good offices of the suppliers of spawn, have made this 1956 publicity effort possible, an effort the success of which is widely acknowledged. So, if you wish to open a new account with a salesman or a sundriesman, examine this list closely. Help and support those who help and support you.

	£	s.	d.
Wm. Artindale & Son Ltd., Salesmen, Castlefolds Market, Sheffield	38	9	0
A. Phippen (Brentford) Ltd., Salesmen, Brentford	5	0	0
H. G. Walker Ltd., Salesmen, Covent Garden Market, W.C.2	10	10	0
Shirley Organics Ltd., Activators, Battersea, London, S.W.11	25	0	0
G. E. Leatherland Ltd., Salesmen, Newcastle-on-Tyne	57	6	0
T. J. Poupart Ltd., Salesmen, Covent Garden, W.C.2	100	0	0
Francis Nicholls Ltd., Salesmen, Smithfield Market, Birmingham	157	10	0
Marks & Co. Ltd., Salesmen, Covent Garden Market, W.C.2	2	2	0
Geo. Jackson & Co. Ltd., Salesmen, Smithfield Market, Birmingham	5	5	0
Thomas Elliott Ltd, Sundries, New Church Road, London, S.E.5	10	10	0
C. H. Deakin Ltd., Salesmen, Smithfield Market, Manchester	10	10	0
H. Dowson & Co. Ltd., Salesmen, Newcastle-on-Tyne	1	1	0
J. W. Laws Ltd., Salesmen, Newcastle-on-Tyne	2	0	0
Dan Wuille & Co. Ltd., Salesmen, Covent Garden Market, W.C.2	50	0	0
J. Collingridge & Co. Ltd., Salesmen, Covent Garden Market, W.C.2.	25	0	0
R. E. Jenkinson Ltd., Salesmen, Covent Garden Market, W.C.2	105	0	0
Ed. H. Lewis & Sons Ltd., Salesmen, Covent Garden Market, W.C.2	5	5	0
P. C. Brown, Biddulph, Stoke-on-Trent	8	6	8
J. N. Proctor, Minskip, York	5	16	0
R. J. McBriar, Overdale, Saintfield, Belfast	5	5	0
N. Olverson, Scarisbrick, Nr. Ormskirk, Lancs.	5	0	0
Stable Manures Ltd., Newmarket and Worthing	30	15	9
J. Jones & Sons, Salesmen, North Market, Liverpool	3	3	0
C. Snowdon & Co. Ltd., Salesmen, Castlefolds Market, Sheffield	22	5	2
*W. Darlington & Sons Ltd., Spawn Merchants, Worthing			
*Farmers & Growers Industries Ltd., Spawn Merchants, Worthing			
*Geo. Monro Ltd., Spawn Merchants, Waltham Cross			
*H. Mount & Sons Ltd., Spawn Merchants, Littlebourne, Canterbury			
*J. E. R. Simons Ltd., Spawn Merchants, Harlow, Essex			
*S. A. F. Sampson Ltd., Spawn Merchant, Oving, Chichester			
*Pinkerton's Scottish Mushroom Laboratories, Spawn Merchants, Millerston, Glasgow			
W. Thew, Beckside North, Beverley, Yorkshire	1	15	4
*Godson & Mallard Ltd., Sundriesmen, Ferringham Lane, Ferring, Sussex			
Somers & Gibson Ltd., Salesmen, Smithfield Market, Mancheseter 4	26	5	0
Reuben Levy Ltd., Salesmen, Spitalfields Market, London, E.1	3	1	2
Walter Lund Ltd., Salesmen, Kirkgate Market, Leeds	5	0	0
Langford Nursery, Clymping, Littlehampton, Sussex	2	12	6
Broome & Green (London) Ltd., Salesmen, 27 James Street, Covent Garden, W.C.1	105	0	0
The Cowling Group, Salesmen, Kirkgate Market, Leeds	10	0	0
Dr. Rempe, Essen-Bredeney, Germany	1	13	8
Bradford Fertilizer Co. Ltd., Girlington, Bradford, Yorks., Activator Merchants	25	0	0
Jackson & Lakin Ltd., Wholesale Market, Nottingham, Salesmen	1	13	0

*The amounts collected by Spawn Merchants are not for publication.

†Previous contributions already acknowledged.

TRADE SHOW

Over the years growers have rightly come to expect the business interests in the industry to be well represented at this annual effort and again this year, at the Eastbourne Exhibition, the trade in general gave their full support.

Among the exhibitors were many old friends who, by their solid backing year in and year out consolidate their established places in the industry as a whole. There was a return of old friends and a warm welcome too to some newcomers.

The Atlas Basket Co. Ltd. (Harpenden, Herts.), with the **British Basket and Besto Co. Ltd.** (Cuxton, Rochester), **Arthur Coomer Ltd.** (Farlington, Portsmouth) and **F. Gough & Son Ltd.** (Fishergate, Norwich) ensured that the basket and container side of the industry was strongly represented. On the stable manure side were **Messrs. D. C. Bushell & Co. Ltd.** (Camberley, Surrey) and **Stable Manures Ltd.** (Worthing and Newmarket), whilst the activator interests were in the hands of **The Bradford Fertilizer Co. Ltd.** (Girlington, Bradford) and **Shirley Organics Ltd.** (Battersea, London, S.W.11). The latter's stand of unusual but attractive design excited much comment.

During the past year or two the machinery side of the industry has put up a strong show and this year was no exception. **E. O. Culverwell Ltd.** (Lewes, Sussex), not only displayed their now well-known turner, but exhibited a much larger model for the first time. Next door was the familiar grey coloured turner of **H. D. Steele & Son Ltd.** (Worthing), whilst further along the line was a junior Comporoto, working too and given its first airing by **J. E. R. Simons Ltd.** (Harlow, Essex). There were some completely new designed machines also; the small self lift truck from **John McRobbie & Sons** (Tomaknock, Crieff) which created quite a stir, and the all-in composter from **F. A. Standen & Sons Ltd.** (St. Ives, Hunts.), which many growers were looking at with particular interest. Those bulwarks of the industry, the spawn makers, merchants, sundriesmen and so on were there as always, **W. Darlington & Sons Ltd.** (Worthing), **S. A. F. Sampson Ltd.** (Oving, Chichester) and **J. E. R. Simons Ltd., Geo. Monro Ltd.** (Hertford Road, Waltham Cross), **Thomas Elliott Ltd.** (120 New Church Road, S.E.5) " we still sell stable manure "; **The Eclipse Peat Co. Ltd.** (Ashcott, Som.), are, as their name implies, specialists in the field of peat; and **Duncton Quarrying Co. Ltd.** (Nr. Petworth, Sussex), followed up their initial visit last year by showing quite a variation in the matter of lime and chalk for growers and let it be known that they also supply fuel oil.

Something quite new and revolutionary in the matter of wide-mesh wire trays for tray growing was the line of **Silverdale Box Supplies Ltd.** (Burgess Hill, Sussex), and other newcomers, **The Standard Box & Carton Co. Ltd.** (32 Pratt Street, N.W.1,) displaying small, easy to fill, cardboard packs.

R. C. DARLINGTON'S

GERMAN "386"

Gold Mushroom Casing Peat

No Spotting of Mushrooms

If you harvest on this Peat your mushrooms will be exceedingly free from all blemishes, ensuring top market prices.

Wooden Frames — Packed — Wrapped Burlap Extra

REGULAR LONDON MONTHLY SHIPMENTS

For the benefit of Worthing and District Growers arrangements have been made to commence fortnightly shipments into Shoreham Harbour—starting December.

Send for Samples and Prices

Willow Laboratories, Hastingwood, Harlow

'Phone : Potter Street 138. ESSEX.

GIANT COMPOSTER

This Gigantic Composter which many growers have seen at work, at Linfield Nurseries, Thakeham, is now to be placed on the open market (see page 409). It will turn a 200 ton stack of composts in 8 hours

PREPACK PROFIT

DELYN PUNNET

Switch to Delyn Punnet and watch your profits soar

* YOU SAVE time and labour in the packing shed. Delyns arrive fully assembled printed with your own name and ready for use.

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Penny, A. C., 35 King Street, Covent Garden, W.C.2.
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Rafferty, Denis, 14 Madeley Road, Ealing, London, W.5.
Ruzicka, H. J., 41 Queensborough Terrace, W.2.
Shirley Organics Ltd., Vicarage Wharf, Battersea, S.W.11.
Woods, Wm., 3 Botolph Alley, E.C.3.

MEXICO

Hongos de Mexico, Madrid, Num. 21-213, Mexico D.F.4.

MIDDLESEX

Berry, A. J., The Dell Mushroom Farm, Reservoir Road, Ruislip Common.
Collins, R. A., Deepmead Nursery, Crews Hill, Enfield.
Markes, R. H., "Tregellas," 180 Harefield Road, Uxbridge.
Palfrey, E., 32 Manor Park Gardens, Edgware.
Stables, G. C., F.C.A., 61 Elm Park Road, Stanmore.
Williams, J., Brentford Market, Brentford.

NEW ZEALAND

Hopkins, B., c/o Mr. W. Paton, 3 Crighton Terrace, Takapuna, Auckland.
Busch, T. C., Dyerville, Martinborough, Wellington.

NORFOLK

Bluestone Farms Ltd., South Creake, Fakenham.
Britton, Major B. G., The Rookery House, Mundesley.
Broadlands Mushroom Farm, White Street, Martham, Great Yarmouth.
Curzon, J. F., Post Office Stores, Horning, Norwich.
Gough, F. & Son Ltd., 63/69 Fishergate, Norwich.
Hannent, S. W., Eifers Nurseries, Spixworth, Norwich.
Hopper, I. K., Holmbush, Thornham, Kings Lynn.
Read, F. G., South Cottage, Deopham, Wymondham.

NORTHAMPTONSHIRE

Brown, H. A., Avalon, Peterborough Road, Farcet, Peterborough.
Day, J. E., Lowick, Nr. Kettering.
Garrow, J. P., The Barn, 8 High Street, Roade.
Gooding, J. A., 9 Chain Close, Peterborough.
Kemp, B. J., 37 Broadway, Peterborough.
Luxmoore, M. C., Snowcap Mushrooms Ltd., Yaxley, Peterborough.
Noble, B. A., Noble Mushrooms Ltd., Yaxley, Peterborough.
Wharton, J., c/o Noble Mushrooms Ltd., Yaxley, Peterborough.

NORTHERN IRELAND

Bates, Geo. & Son Ltd., St. George's Market, Belfast.
Bell, George, Hazel Glen, Magheraknock, Ballynahinch, Co. Down.
Forsythe, W. J. & Son Ltd., Fairview Nurseries, Bangor, Co. Down.
Kernohan, S. H., Lower Broughshane, Ballymena.
Lefroy, I., Ferns Hollow, Killaloe, Co. Clare.
McBriar, R. J., Overdale, Saintfield, Belfast.
Moffett, John A., Drumcroon, Coleraine, Co. Derry.
Nelson, R. G., Ballylumin, Ahoghill, Co. Antrim.
Patterson, Robert, Monlough Food Production Co. Ltd., Ballygowan, Belfast.
Taylor, Robert, Rex Products Ltd., Temple Patrick, Belfast.
Young, Mrs. M. B., Mountsandel, Coleraine, Co. Londonderry.

NORTHUMBERLAND

Bird, J. P., Ltd., St. Andrew's Street, Newcastle-on-Tyne.
Leatherland, G. E. Ltd., 20/22 St. Andrew's Street, Newcastle-on-Tyne.
Pearson, S. & Son, 40 Green Market, Newcastle-on-Tyne 1.

NORWAY

Eyde, S. M., Sande Bruk, Horten.
Reffstrup, Knud, Wollebekk Gard, Okern, Oslo.

NOTTINGHAMSHIRE

Bentley, A. J., Ltd., Frearson Farm, New Eastwood, nr. Nottingham.
Cave, A. E., The Hollies, East Bridgeford.
Cwynar, S., 392 Valley Road, Basford.
Kavell, W. L., 199 Musters Road, West Bridgford, Nottingham.
Kublicki, S., Old Estate House, Wollaton, Nottingham.
Laniashire, R., 12 Moseley Road, Annesley.
Lichtarowicz, Col. L., Mapperley Mushroom Farm, 7 Mapperley Park Drive, Nottingham.
Nason F. R. Ltd., Avenue " B," Wholesale Market, Nottingham.
Smalley, Geo. Ltd., Sneinton Market, Nottingham.
Tooley, C. W. & Sons Ltd., Wholesale Market, Nottingham.

OXFORDSHIRE

Courage, Mrs. H., Edgcote, Banbury.
Dudley, Ivor, Elmwood, Black Burton.
Summers, Sir Spencer, M.P., Thenford House, Banbury.
Winslade, Miss M. G. D., 95 Stanway Road, Headington.

PORTUGAL

Pereira, Manuel, Junr., Conservas de Pene, Redes de Pesca, Rua de S. Paulo, 12-4º, Lisbon.
van Uden, Dr. N., Departmento de Micologia, Instituto Botanico, Lisbon.

SCOTLAND

Alexander, Miss E. K., Red House Mushrooms, Bridge of Allan, Stirlingshire.
Allsop, H. S., Kingsley, Fennwick Road, Kilmaurs, Ayrshire.
Beveridge, John & Co. Ltd., Bridgend, Kinross.
Clelland, Wm. Jnr., Crag Cottage, Burnfoot, Kirkmuir Hill, Lanark.
Crawford, I. A., Glaschoille Cottage, nr. Drymen, Stirlingshire.
Dumbreck, R. D., Mossgiel, Dysart, Fife.
Galbraith, W. S., Albethy, Bridge of Allan, Stirlingshire.
Gaw, Thomas, 20 Corrie Crescent, Saltcoats, Ayrshire.
Hampton, J. W., Foresters Cottage, Drumoak, Aberdeenshire.
Harris, R. M., 1 Kintillo Gardens, Bridge of Earn, Perthshire.
Helebrandt, K. S., Kingsley, Crieff, Perthshire.
Jackson, T., Dillaburn, Lesmahagow, Lanark.

SCOTLAND—*contd.*

Melville, A. Campbell, Fala, Errol, Perthshire.
Mitchell, W. A. B., The Old Mill, Pitlochry, Perthshire.
Oliver, A. P., The Mushroom Sheds, Buckholme Mill, Galashiels.
Pinkerton, M. H., Hogganfield Farm, Millerston, Glasgow.
Pinkerton's Scottish Mushroom Laboratories, Millerston, Glasgow.
Smith, A. Vermont, Falkirk, Stirlingshire.
Stratton, T., 1 Nethermill Cottages, Aberargie, Abernethy, Perthshire.

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Co-operative Wholesale Society Ltd., Roden, Wellington, Salop.
Pickles, G. & H., Enchmarsh, Leebotwood.
Thomas, Major H. Seymour, Oerley Hall, Oswestry.

SOMERSET

Eclipse Peat Co. Ltd., Ashcott.
Griffiths, G., Wrington Vale Nurseries, Congresbury.
Lloyd, J. H., Shrub Farm, Brent Knoll, nr. Highbridge.
Pointing, A. G., Grove House, Weston Park, Bath.
Pointing, S., Byfield Farm, Combe Down, Bath.
Pratten, J. F., Cheddar Valley Nurseries, Axbridge.
Wilson, Major D. A., The Steeple, West Camel, Yeovil.

SOUTH AFRICA

Braeside Mushroom (Pty.) Ltd., P.O. Box No. 77, Hillcrest, Natal.
Chitters, Dr. Max, 18 St. Andrew's Avenue, Senderwood Post Office, Orange Grove, Johannesburg.
Cox, T. A., P.O. Kloof, Natal.
Denny, W. L. M., Everglades Mushroom Farm, P.O. Lyndhurst, Johannesburg.
Dippenaar, Prof. Barend J., University of Pretoria, Pretoria.
East Lynn (PVT) Ltd., P.O. Box 128, Umtali, S. Rhodesia.
Garthorne, D. S., Morning Dew Mushrooms, P.O. Box 202, Johannesburg.
Garlick, Mrs. Joyce, Chilterns, Wynberg, Cape.
Hulley, P., Orkney Farm, P.O. Box 455, Umtali, Southern Rhodesia.
Kark, Dr. Charles, 58 Lister Buildings, Jeppe Street, Johannesburg.
Kumst, Cyril, Lot 35 Epsom Road, Newmarket Estates, Alberton.
Louw, Dr. P. G. J., P.O. Box 87, Lyttelton,.
Maritz, Stephen, P.O. Box 1432, Johannesburg.
Omerod, C. O., P.O. Box No. 282, Stettenbosch.
Otto, Mrs. E., 2 Jonkershoek Road, Hill Extension, Johannesburg.
Robertson, Mrs. H. F. G., P.O. Box 93, Bergvlei, Transvaal.
Skeeles, W. R., " Midhurst," Constantia, Cape.

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Beck, Alfred, Apartado Aereo 6465, Bogota, Colombia.

SPAIN

Aecbo, D. Luis Gomez, Paseo de la Castellana 61, Madrid
Molinas, Alfredo M., Diputacion 282, Barcelona
Roca, Jacques, Mandri 60, Barcelona.

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Brown, P. C., The Birches, The Coppice, Biddulph, Stoke-on-Trent
Dajnowiez, S., Bonehill Mushroom Farm, 25 Park Lane, Bonehill, Tamworth.
Dickinson, Thomas, Wholesale Market, Wolverhampton
Dingles, Alan, 84 Station Road, Polesworth, Tamworth.
Homer, C. H., 139 Waterfall Lane, Blackheath.
Howse, R. R., Nine Acre Farm, Codsall.

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Walsall Mushroom Co. Ltd., Longwood, Walsall.

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Griffiths, D., Amento, Moulton, Newmarket.
Piatkowski, Capt. S., Town Pightle, Dunwich Lane, Peasenhall, Saxmundham.
Sheldrake, Miss Dorothy M., 16 Holton Road, Halesworth.
Thomas, L. S., Gt. Welnetham, Bury St. Edmunds.

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Adkin, T. O., Hound Cottage, Shere.
Adby, F., Weydon Hill Nursery, Farnham.
Ady, John & Co. Ltd., Rowly Drive, Cranleigh.
Bagnall, D. N. K., Overmist, The Avenue, Tadworth.
Baker, G. W., Broadham Produce Co. Ltd., Station Road, Oxted.
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Bowles, Dr. V. H., Brightleigh Farmhouse, Outwood, nr. Redhill.
Brown, George, Crosswater Farm Cottage, Churt.
Burrows, S., 105 Oaks Avenue, Worcester Park.
Bushell, D. C. & Co. Ltd., Sandhurst Mills, Camberley.
Carew-Shaw, E., Courtlands, Shipley Bridge, Horley.
Chapman, H. B., Newstead Hall, Horley.
Dalton, D. N., Leigh Mill House, Godstone.
Edmunds, A. O., The Moorings, Limpsfield.
Figgis, T. G., Tyne Lodge, Coldharbour Road, West Byfleet.
Fillis, W. J. J., Pear Tree Cottage, 18 Folly Hill, Farnham.
Gardner, R. W., Crofton, 9 Glendale Drive, Burpham, Guildford.
Harrington & Jessop, 57 Abbey Road, Horsell, Woking.
Heather Farm Ltd., Horsell Common, Woking.
International Heating & Ventilating Co. Ltd., 4 Denbigh Gardens, Richmond.
Jennings, R. W., 37 Kingston Road, Leatherhead.
Jones, A. D., "Hythings," Station Road East, Oxted.
Livingstone, F. G., "Bracken," Churt,.
Millais, E. G., Crosswater Farm, Churt.
Nommensen, D. M., Heather Farm, Horsell Common, Woking.
Oliver, W., The Garden Caravan, Bridley Manor, Worplesdon.
Piette, Mrs., 21 Montague Road, Richmond.
Reed, Guy, Riverdale Mushroom Farm, Send Road, Old Woking.
Reed, Peter, Hillside Mushroom Farm, Windlesham Road, Chobham.
Rudkin, T. J., Highfields Nurseries, Big Common Lane, Bletchingley.
Shackleford Nurseries Ltd., Eashing, nr. Godalming.
Smith, Trevor A., "Burrington," Welcomes Road, Kenley.
Sparling, T. A. G., Bridges Wood, Burstow, nr. Horley.
Stevens, P. J., "Shrapnels," Old Byfleet.
Wade, B. W., Chellows Park, Crowhurst, Lingfield.
Wilkins, P. N. J., Lydyard Cottage, Shamley Green.

SUSSEX
Adams, A. E., Sunnybank, West End, Henfield.
Atkinson, G. G., Messrs. Lindfield Nurseries Ltd., Noah's Ark Lane, Lindfield.
Barton, H. F., Winterpick Nurseries, Church Lane, Plummers Plain, Horsham.
Bell, L. G., North Angmering Nursery, Arundel Road, Angmering.
Boxall, H. G., Lansdowne Nurseries, Dappers Lane, Angmering.
Brautigam, V., Ivy Arch Road, Worthing.
Bulloch, McGregor, The Cottage, New Road, Littlehampton.
Chamberlin, W. L., Duncans, Billingshurt.
Church Farm Nurseries Ltd., Rustington.
Coulson, H. L., Lindum Nurseries, Littlehampton Road, Worthing.
County Agricultural Officer, Sussex (West) A.E.C., 40 North St., Chichester.

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Curry, Lt. Col. A. R., Rest Harrow Farm, West Chiltington.
Darlington, R. G., Southcourt Road, Worthing.
Darlington, W. & Sons Ltd., Southcourt Road, Worthing.
Day, Gerald, W., 100 Offington Drive, Worthing.
Dixon, L. C., Burygate, Bury, nr. Pulborough.
Dowmunt, T. M., Holly Grove, Newick.
Farmers' & Growers' Industries Ltd., British Railway Goods Yard, West Worthing.
Flegg, P. B., Glasshouse Crops Research Institute, Littlehampton.
Filmer, F. L., Lt. Wolstead Farm, Lindfield.
Filmer, John W., Hempstead Mill, Uckfield.
Forsdike, L., Elm Nursery, Elm Drive, Lancing.
Francomb, K. V. S., Meadow Nursery, Oakwood Road, Burgess Hill.
Godfrey, W., 19 Offington Lane, Worthing.
Godsmark, F. B. & Son, Grinstead Nursery, Grinstead Lane, Lancing.
Godson & Mallard Ltd., Ferringham Lane, Ferring.
Grant, G. F. B., Church House, Washington, Pulborough.
Greenyer, C. T., Broadwater Green Nurseries, Worthing.
Hartley, N., 85 Wembley Avenue, Lancing.
Hopkins, R. J., Hammer Lane Farm, Vines Cross, Horam.
Jarvis, M. C., Culberry Nursery Ltd, Dappers Lane, Angmering.
Jupp, J. S., Bridge Nurseries, Coldwaltham, Pulborough.
Keens, W. F., Meadway Mushroom Farm, Littlehampton Road, Durrington, Worthing.
Kessler, J. L., Dingley Nurseries, Rustington.
Kirtlan, A. M., Church Nursery, Terringes Avenue, Worthing.
Knaggs, F. B., Chantryfield Nurseries, Arundel Road, Angmering.
Knight, F., The Glen, Langney, nr. Eastbourne.
Knight, W., Arendee, Langney, Eastbourne.
Langford Nursery, Clymping, Littlehampton.
Laing, R. G., Seven Acres Nursery, Arundel Road, North Angmering.
Leeney, A. G., Apple Tree Cottage, 46 Poulters Lane, Worthing.
Linfield, A. G. Ltd., Chesswood Nurseries, Thakeham.
Lisher, G. A., Brierley, Grinstead Lane, Lancing.
Lower North Barn Nurseries Ltd., 6 Third Avenue, Lancing.
McBride, P. S., Tubwell Nurseries, Maynards Green, Horam.
McLellan, Col. M., Ellwood Mushroom Farm, Rotherfield.
Passmore, J. J., Anchorage, Worthing Road, Rustington.
Pledger, G. E., 32 Coombe Rose, Worthing.
Read, H. F. J., 6 Brookway, Beeding, Steyning.
Sampson Mushrooms Ltd., Rushmans Nursery, Oving, nr. Chichester.
Sanford, Capt. A., Searles Gardens, Fletching.
Seymour & Girling Ltd., Angmering Nurseries, E. Preston, Littlehampton.
Sparkes, A. G., Smugglers Farm Ltd., West End Nurseries, Roundstone Lane, East Preston, nr. Littlehampton.
D. A. Sparkes, Warren Nursery, Old Worthing, East Preston.
Thompson, R., Church Farm House, East Wittering, Chichester,
Tickner, H. Junr., 15 Astaire Avenue, Eastbourne.
Tyrrell, J. W. H., Sparkes Nursery, Walberton, Arundel.
Ulm, J., Cupressus Nurseries, Washington, Pulborough.

SWEDEN

Felix, M. Herbert, P. Hakanssons Konserver A/B, Eslov.
Mattson, Mrs. Elsa, Fammarps, Sondrum, Halmstad.
Ohman, Ingrid, Hogmoravagen 34, Alta, nr. Stockholm.
Oscander, Karl, c/o Alimenta Co., Partille.
Sjostedt, Sven, P. Hakanssons Konserver A B, Eslov.
Stridsberg, H., N:r 25, Lockarp.
Swedish Institute for Food Preservation Research, Kalleback, Goteborg.
Wendler, B. T., P.B.15, Halmstad.

SWEDEN—*contd.*

Westin, Gunnar, Daltorpsgatan 49b, Goteborg.
Wiberg, Anders, Ovra Fogelbergsgatan 3, Goteborg.

SWITZERLAND

Buttikofer, Ernst, Rue du Sapin 3, Fleurier.
Hadorn, E., Champignon-Zentrale, Zurich 4, Werdstrasse 73.
Kuhn & Co., Champignon-Kulturen, Alpsteinstr 56, Herisau.
Parmentier, J. & Co., 15 Route du Camp, Plan-les-Oouates, Geneva.

UNITED STATES OF AMERICA

Bailey, J. Finley, c/o West Foods Research Dept., P.O. Box 447, Soquel, California.
Blank, Bernard B., c/o California Mushroom Farms Inc., 11600 E. Washington Boulevard, Whittier, California.
Brandywine Mushroom Corporation, West Chester, Pennsylvania.
de Wire, Paul, Kennett Square, Chester County, Pa.
Dimm, S. D., 850 Thornton Street, San Leandro, California.
Domosh, Stanley, J. B. Swayne & Son Inc., Kennett Square, Pa.
Dyke, R. A., Indiana Mushroom Corporation, West Terre Haute, Indiana.
Fairchild, Thomas, Winconsin Mushroom Co., Route 14, Box 513, Milwaukee 14, Winconsin.
Florida Mushroom Co., 5550 N.W. 36th Avenue, Miami, Florida.
Fred, Corwin, Lebanon, Ohio.
Frezzo, E. & Sons, Toughkenamon, Pa.
Fry, Norman, Walnut Hill Mushrooms Inc., Bettsville, Ohio.
Gaspari Brothers, Frush Valley and Georgia R., Temple, R.D.I., Pa.
Green, Jacob M., 1454 Valley Road, Coatesville, Pa.
Green, W. Howard, c/o Concord Foods Inc., Concordville, Pennsylvania.
Pennell, E. L., Grocery Store Products Co., Union and Adams Streets, West Chester, Pa.
Jaggie, Jos., Box 14, Kennett Square, Pa.
Knaust, Henry, West Camp, New York.
Knaust, Henry Jnr., Knaust Mushrooms Inc., Vallmeyer, Illinois.
Kneebone, Dr. Leon R., Associate Professor of Botany, Pennsylvania State College, Pa.
Leo, John C., Box 96, Toughkenamon, Pennsylvania.
Leo, Vincent A., 241 North Union Street, Kennett Square, Pennsylvania.
Leslie, Neale, 629, "C" Street, Petaluma, California.
Losito, Vincent & Sons, Toughkenamon, Pa.
Marino, Albert Di., Toughkenamon, Pa.
Mastarone, F. J., Mushroom Farm, RD2, Leechburg, Pa.
Michaels, Joseph M., R2 Box 197, Naperville, Illinois.
Michigan Mushroom Co., Dawn Fresh Products, Niles, Michigan.
Mushroom Supply Co. (*U.S.A.*), Toughkenamon, Chester County, Pennsylvania.
Ostrom Mushroom Co., 12645 27th Avenue North East, Seattle 55, Washington.
Pusey, J. D., Avon Heights Mushrooms, Box F., Avondale, Pa.
Reeve, Eldrow, Box 215, West Chicago, Illinois.
Santucci, V. & A., Avondale, Pa.
Slonina, Mitchell, S.S. Food Producers Inc., Box 194, Mt. Prospect, Illinois.
Snow Cap Mushrooms Inc., 71-75 Wyman Street, Woburn, Mass.
Speakman, E. B., Avondale, Chester County, Pa.
Strode, E. A., Box 104, Avondale, Pennsylvania.
Tameling Brothers, 3840 S. Laramie, Cicero 50, 11.
Thompson, F. G., Mushroom Supply Co., Toughkenamon, Chester Co., Pennsylvania.
Tucker, M. W., c/o West Foods of California, P.O. Box 447, Soquel, California.
West, Howard R., West Foods Inc., P.O. Box 590, Salem, Oregon.
West, Roland E., West Foods of California, Souquel, California.
Wick, Robert, L., 1012 Joliet Street, West Chicago, Illinois.
Yarboro, Scott P., P.O. Box 66, Lacey, Washington.
Yoder, John B., Butler Co. Mushroom Farm, West Winfield, Pennsylvania.

WALES
Aubrey, R. W., Derwen, Pontfadog, Wrexham, Denbighshire.
Davy, D. C., Salmons House, New Road, Crickhowell, Brecs.
Elan Valley Products Ltd., Dol-Afallen, Llandrindod Wells, Rads.
Guthrie, J. A., Westbourne, Coalbrook Road, Pontyberem, Llanelly, Carms.
Brynmor, Griffiths, Gyfylchi Farm, Pontrnydyfen, Port Tablot.
Llanerch Mushroom Farm Ltd., St. Asaph, N. Wales.
Morgan, Wm. & Co. Ltd., Custom House Street, Cardiff, Glamorgan.
Wyndham-Jones, H., Llanfoist, nr. Abergavenny, Mon.

WARWICKSHIRE
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Nicholls, Francis Ltd., Smithfield Market, Birmingham.
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Richards, W. D. Ltd., Smithfield Market, Birmingham.
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White, J. V. & Co., Smithfield Market, Birmingham.
Wildsmith, E. S., 229 Holbrook Lane, Coventry.
Williamson, A. (19) Ltd., Smithfield Market, Birmingham 5.

WILTSHIRE
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Cooper, R. N., 44 Boreham Road, Warminster.

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Lea, J. S. B., Dunley Hall, Stourport.
Phipps, J. D. B., Broad Close, Broadway.

YORKSHIRE
Atkinson, W. R., West Dock Timber Co., Ltd., Manchester Street, Hull.
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Barraclough, H., Westerton Farm, West Ardsley, Wakefield.
Brook, T. B., Rods Farm, Morley, nr. Leeds.
Broomhead, R., Beckwith Knowle Gardens, Otley Road, Harrogate.
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Emsley & Collins (Halifax) Ltd., Piece Hall, Halifax.
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Gill, D. B., Canal Produce Co. Ltd., Canal Road, Selby.
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Neuman, N., 210 Cross Lane, Newsome, Huddersfield.
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Stuart, N., 36 Summergangs Road, Hull.
Stuart & Simms, Burstwick, Hull.
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Thorne, Philip R., Greenways, Weston, Selby.
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Weatherall, Lt. Col. N. E., Sandford House, Richmond.
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Dekeirel, P., 7 bis Rue du Louvre, Paris, France.
Dorey, O. G., Wye College, Ashford, Kent.
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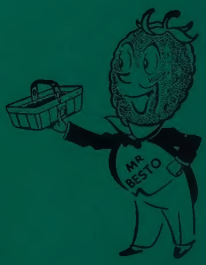

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